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417A. Proposed by ELMER SCHUYLER, Brooklyn, N. Y.

Solve $E(x^2) - E(3x) = 7$, where $E(m)$ is the largest integer in m . The value of x is to be in the form $4 + (y/32)$ where y is an integer.

This problem was incorrectly numbered 417.

SOLUTION BY A. M. HARDING, University of Arkansas.

If we draw the graphs of the functions $E(x^2)$ and $E(3x) + 7$ we find

$$E(x^2) = E(3x) + 7 = 20, \quad \text{if} \quad \sqrt{20} < x < \sqrt{21}; \quad \text{i. e.} \quad 4.4721 < x < 4.5826;$$

$$E(x^2) = E(3x) + 7 = 21, \quad \text{if} \quad 14/3 < x < \sqrt{22}; \quad \text{i. e.} \quad 4.6667 < x < 4.6904;$$

$$E(x^2) = E(3x) + 7 = 2, \quad \text{if} \quad -5/3 < x < -\sqrt{2},$$

$$\text{i. e.} \quad -1.6667 < x < -1.4142.$$

Now we must have $x = 4 + y/32$ where y is an integer. Hence

$$4.4721 < 4 + y/32 < 4.5826, \quad \therefore y = 16, 17, \text{ or } 18.$$

And

$$4.6667 < 4 + y/32 < 4.6904, \quad \therefore y = 22.$$

$$-1.6667 < 4 + y/32 < -1.4142, \quad \therefore y = -181, -180, \dots, -174.$$

GEOMETRY.

430. Proposed by DANIEL KRETH, Wellman, Iowa.

The distance between A and B is always a feet. A travels along a straight path at the rate of v_1 miles per hour, and B starts at the same time in the path behind A and travels in a curve at the rate of v_2 miles per hour. How far will B travel to reach the path in front of A , and how far to reach the path again behind A ?

SOLUTION BY ELIJAH SWIFT, University of Vermont.

Take the origin at the place where B starts and the Y -axis through A . Then the coördinates of A at any time, t , are $(0, a + v_1t)$, and those of B must satisfy the equations

$$(1) \quad x^2 + (y - a - v_1t)^2 = a^2, \quad (2) \quad \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 = v_2^2.$$

Solving (1) for y , we have $y = -\sqrt{a^2 - x^2} + a + v_1t$, where the negative sign holds until B is abreast of A .

Substituting this value in (2), we have a quadratic equation in dx/dt , from which we find

$$\frac{dx}{dt} = \frac{\sqrt{a^2 - x^2}}{a^2} \{-v_1x + \sqrt{v_1^2x^2 - a^2v_1^2 + a^2v_2^2}\},$$

the plus sign of the second radical being taken since dx/dt is positive.

From equation (2), we deduce $ds = v_2dt$. Hence, we have

$$s \equiv v_2t = 2 \cdot v_2 \cdot a^2 \int_0^a \frac{dx}{\sqrt{a^2 - x^2} \{-v_1x + \sqrt{v_1^2x^2 - a^2v_1^2 + a^2v_2^2}\}},$$